Scientific and Biometrics Analysis Unit - Trace Evidence Processing Procedures

1 Scope

1.1 This document describes guidelines used by personnel within the Scientific and Biometrics Analysis Unit - Trace (SBAU-Trace) for the processing of physical evidence comprised of improvised explosive devices (IEDs), derivatives thereof, and associated items.

1.2 The nature and extent of processing will be determined by the type of evidence submitted, the extent of prior handling of the evidence, and the extent of prior forensic examinations on the evidence.

1.3 Guidelines for the examination and comparison of hairs, textile fibers, fabric, and cordage can be found in the specific protocols for those examinations.

2 Equipment/Materials/Reagents

- Stereo binocular microscope, magnification range from 0.5x to at least 40x
- Permount® mounting medium
- Xylene substitute, Xyless, or Xylene
- Glass microscope slides and coverslips
- Kraft paper
- Pillboxes
- Forceps
- Spatula
- Scissors
- Probes
- Digital camera
- un-du®
- Appropriate personal protective equipment (PPE)
- Disassembly tools as required (*e.g.*, screwdriver, wire cutters)
- Uline® plastic or equivalent
- Blotter paper
- Lint free wipes
- Cavicide®, bleach, or equivalent cleaning solution
- Appropriate item packaging (*e.g.*, zip lock bags)

3 Standards and Controls

Not applicable.

4 Sampling

Based on the condition of the submitted items and the number of hairs and/or fibers present/collected, a single sampling scheme cannot account for all possible scenarios. As a result, if not all of the hairs and/or fibers will be mounted, examiner or physical scientist discretion will determine a representative sample on a case-by-case basis. A representative sample is a selection of hairs and/or fibers that captures the varying characteristics of the total hairs and/or fibers collected from an item of evidence.

For a known fiber sample selection, the representative sample will represent the range of colors and fiber types comprising the item.

5 Procedures

5.1 Processing Improvised Explosive Devices, Derivatives, and Associated Items

5.1.1 Before evidence is processed, the processing area and all utensils (*e.g.*, forceps, scissors) will be cleaned using, at a minimum, a spray cleaner such as Cavicide® and a lint free wipe. Utensils will be cleaned, at a minimum, between cases or between items within a case, if deemed appropriate.

5.1.2 Gloves, at a minimum, will be changed between cases. Other PPE will be changed as necessary. Facemasks will be worn during the processing of items/cases that have potential for DNA analysis.

5.1.3 Each case will be processed over clean paper that is placed on the surface of a table. Paper will be changed, at a minimum, between cases or between items within a case, if deemed appropriate based on the items submitted.

5.1.4 Accessory lighting and magnification may be used as needed.

5.1.5 Items of evidence will be described to include any useful information, such as type of device, device construction, details of components, and any indications of previous exploitation/examination.

5.1.6 Evidence may be photographed with a digital camera. The photograph will include the date the photo was taken, the item number of the evidence, and the FBI Laboratory number, either in the photo or its caption.

5.1.7 There may be times during the examination process when an item of evidence needs to be subdivided. Subdividing an item may occur when an item not initially noted during the evidence inventory process is found or if an item is disassembled during the examination process and needs to be uniquely identified. An examiner and/or physical scientist may subdivide an item as

necessary. For Legacy cases, a point system will be used (*e.g.*, Q1 Battery and fabric becomes Q1 Battery, Q1.1 Fabric from Q1). For Forensic Advantage (FA) cases, a dash system will be used (*e.g.*, Item 1 Battery and tape becomes Item 1 Battery, Item 1-1 Tape from Item 1).

5.1.8 Unexposed areas of the evidence are typically the only areas processed for hairs and/or fibers. This includes the adhesive side of tape adhering to the device or other tape, the inside of the device if unopened, and from within hot glue. Hairs and/or fibers will not be recovered from the adhesive side of tape that has been previously exposed prior to receipt in SBAU-Trace or found as loose debris. Additional areas may be processed on a case-by-case basis at examiner discretion.

5.1.9 The screening of the evidentiary item is facilitated by the use of a stereobinocular microscope. Potential hairs and/or textile fibers will be picked off of the item with forceps and mounted directly onto glass microscope slides following the procedures listed below (See Sections 5.4 and 5.5). The microscope slide will be appropriately marked with the Laboratory number, specimen number, and initials of the processor. Slides may additionally be labeled with the two letter country code the evidence originated from and information on where on the item the hairs and/or fibers were collected from.

5.1.9.1 Items with a potential explosive nature (*e.g.*, explosively formed projectiles and detonation cord) may need to be processed outside the Laboratory. Potential hairs and/or textile fibers will be picked off of the item with forceps and placed in paperfolds for further examination in the SBAU-Trace laboratory suite or may be directly mounted onto glass microscope slides. If paperfolds or slides are generated, they will be appropriately marked with the Laboratory number, specimen number, and initials of the processor. Paperfolds and slides, for FA cases, will be assigned an item number(s) after return to the Laboratory.

5.1.10 Tape will be placed on plastic sheeting after processing. For DNA items/cases, plastic that has been UV treated will be utilized. The plastic sheeting will be appropriately marked with the Laboratory number, specimen number, initials of the processor, and, if appropriate, a description of where the tape was located (*e.g.*, tape from battery), and/or identification of ends possibly suitable for potential DNA analysis. This will be added to the processing notes by indicating that the plastic sheeting/tape was annotated for DNA.

5.1.10.1 Tape in FA cases may be subdivided at the conclusion of the trace evidence examinations to facilitate DNA and latent print examinations. Tape will be reported by SBAU-Trace as a part of the item the tape originated from. If any tape remains in or on the item and is not sub-divided, this will be indicated in the processing notes. An absence of this information in the processing notes implies that all of the tape was sub-divided.

5.1.11 Fabric and cordage will be described regarding condition, color, and general construction. Fabric and cordage may be processed for hairs and/or fibers on a case-by-case basis. If necessary, a known sample of fabric or cordage will be removed and placed in a paperfold, and appropriately marked with the Laboratory number, specimen number, and initials

of the processor. Information regarding color and construction will be input into the appropriate SBAU-Trace database.

5.1.12 After the item of evidence has been processed, it will be returned to its primary packaging, sealed, and placed into the external container. Plastic sheeting with processed tape will be placed in a separate sealed zip lock bag, labeled as tape from the appropriate specimen number, subdivided and barcoded for FA cases, and placed into the external container. The external container will be sealed after all items have been processed, sealed, and placed into it.

5.1.13 After the case has been processed, it will be properly stored in a limited access storage or examination area to await return to the Evidence Management Unit.

5.1.14 All evidence packages and/or boxes not under active examination must be under proper seal. The FBI Laboratory number will be clearly visible.

5.2 Processing Debris Collected at Other Laboratories

Debris collected at other laboratories will only be examined if details on the location where it was collected from are provided and fall within the criteria established by the SBAU-Trace (See Section 5.1.8). An SBAU-Trace Examiner or Physical Scientist will make the determination on the suitability for examination if Evidence Management personnel request assistance. For FA cases, if an item of debris is received in SBAU-Trace and will not be examined, an entry will be made in the Case Communication Log to document the reason. For Legacy cases, if an item of debris is received in SBAU-Trace and will not be examined, the Evidence Management Unit will be notified to make a comment in EXPeRT.

5.3 Processing Clothing and Other Large Items by Scraping

SBAU-Trace does not routinely process evidence by scraping. If a case is submitted that contains items that will be scraped, SBAU-Trace will follow the *Trace Evidence Unit Evidence Processing Procedures*.

5.4 Debris Screening and Slide Preparation - Hairs

5.4.1 Hairs will be mounted on a clean glass microscope slide using a suitable mounting medium such as Permount®. The microscope slide will be appropriately marked with the Laboratory number, specimen number, and initials of the processor. Slides may additionally be labeled with the two letter country code the evidence originated from and information on where on the item the hairs were collected from.

5.4.2 Placing a thin film of solvent (*e.g.*, Xylene substitute) on the surface of the slide will allow hair samples to adhere temporarily until the mounting medium is applied. Using clean forceps, hairs will be placed onto the slide and arranged so they can be completely covered by the glass coverslip.

5.4.3 Excess solvent will be blotted off prior to the mounting medium being applied, if needed. The used blotter paper will be discarded in the appropriate receptacle (see FBI Laboratory Safety Manual) between slides.

5.4.4 Forceps will be carefully cleaned between different items/paperfolds/pillboxes.

5.4.5 When mounting several hairs of different lengths on a single slide, the length of the longest hair will be recorded on the slide.

5.4.6 When a large number of hairs are present on the evidence/in the debris, a representative sample of hairs with different characteristics (*e.g.*, lengths, color, texture, thickness) may be mounted. The number of hairs mounted on glass microscope slides may be influenced by the types of hairs in the questioned debris, the types of hairs in the known hair samples, if available, and the circumstances of the case. The letters "R/S" will be placed on the glass microscope slide and will be included in the case notes to indicate that a representative sample of hairs were mounted.

5.4.7 If known hair samples are received and will be examined, the known hairs will also be mounted by following the steps in this section. The letters "KN" to signify "Known Sample," will be written on the end of the glass microscope slide.

5.5 Debris Screening and Slide Preparation - Fibers

5.5.1 Fibers will be mounted on a clean glass microscope slide using a suitable mounting medium such as Permount®. The microscope slide will be appropriately marked with the Laboratory number, specimen number, and initials of the processor. Slides may additionally be labeled with the two letter country code the evidence originated from and information on where on the item the fibers were collected from.

5.5.2 Placing a thin film of solvent (*e.g.*, Xylene substitute) on the surface of the slide will allow fiber samples to adhere temporarily until the mounting medium is applied. Using clean forceps, fibers will be placed onto the slide and arranged so they can be completely covered by the glass coverslip.

5.5.3 Excess solvent will be blotted off prior to the mounting medium being applied, if needed. The used blotter paper will be discarded in the appropriate receptacle (see FBI Laboratory Safety Manual) between slides.

5.5.4 Forceps will be carefully cleaned between different items/paperfolds/pillboxes.

5.5.5 When the number of fibers present on the evidence/in the debris is such that all of the fibers cannot reasonably be mounted on a glass microscope slide(s), a representative sampling of fibers of different colors, shapes, and sizes will be mounted. The number of glass microscope slides prepared will be dependent on the number and types of fibers seen on the item, in the

questioned debris, and the circumstances of the case. The letters “R/S” will be placed on the glass microscope slide and will be included in the case notes to indicate that a representative sample of fibers was mounted.

5.5.6 When complete yarns are identified, they will be thoroughly characterized (*e.g.*, color, construction) before being separated and mounted onto a glass microscope slide. Consideration will be given to physically matching yarns to damaged fabric before mounting fiber samples from the yarn on a slide.

5.6 Selection and Preparation of Known Fiber Slides

5.6.1 A known sample will be selected that represents the range of colors and fiber types comprising the textile.

5.6.2 If possible, known samples will not be taken from damaged areas because of potential future physical matches.

5.6.3 Fiber samples representing all of the different colors and types of fibers comprising the textile will be mounted. Warp fibers and weft/fill fibers may be mounted separately. Sewing thread and button thread fiber samples may also be mounted.

5.6.4 Fibers will be mounted on a clean glass microscope slide using a suitable mounting medium such as Permount®. The microscope slide will be appropriately marked with the Laboratory number, specimen number, and initials of the processor. Slides may additionally be labeled with the two letter country code the evidence originated from. The letters “KN” to signify “Known Sample,” will be written on the end of the glass microscope slide.

6 Calculations

Not applicable.

7 Measurement Uncertainty

Not applicable.

8 Limitations

Not applicable.

9 Safety

9.1 While working with physical evidence, Laboratory personnel will wear appropriate PPE (at a minimum, a laboratory coat and gloves).

9.2 Universal precautions will be followed.

9.3 No specific hazards are associated with the microscopic examination techniques performed.

9.4 The Safety Data Sheet (SDS) should be referred to for guidelines regarding the use of a specific chemical.

10 References

- FBI Laboratory Quality Assurance Manual.
- FBI Laboratory Operations Manual.
- FBI Laboratory Safety Manual.
- *Trace Evidence Unit Evidence Processing Procedures*.

Rev. #	Issue Date	History
0	10/02/2017	Original issue for incorporation into the FBI Laboratory quality system. Replaces a previous version of this document that was in use prior to the quality system merger.
1	02/10/2020	Updated unit name throughout. Standardized italicization throughout. Section 4: Updated wording to sampling, added that PSs could make representative sampling decision. Section 5.2: Added PSs could make suitability determination. Section 5.3: Clarified when a processing plan would be generated. Updated minor wording to Sections 5.1.9, 5.1.9.1, 5.1.12, 5.4.6, 5.5.2, 5.5.5, 5.5.6, 5.6.3, 5.6.4 for clarity. Section 5.4.7: Added requirement to put 'KN' on known slides. Updated document title in references.

Approval

Redacted - Signatures on File

Scientific and Biometrics Analysis Unit Chief: Date: 02/07/2020

Hairs and Fibers Technical Leader: Date: 02/07/2020